

ORIGINAL ARTICLE
ΕΡΕΥΝΗΤΙΚΗ ΕΡΓΑΣΙΑ

Participation at a regional blood donation centre in Crete (Greece) during the SARS-CoV-2 pandemic lockdown period

OBJECTIVE To investigate the frequency of volunteer blood donation during the lockdown period. **METHOD** A retrospective-observational study was carried out in the spring of 2021 at the blood donation department of a general hospital in Crete, in Greece. The study retrieved archival data on 3,704 blood donors, comparing four months, two before (April and November 2019) and two during (April and November 2020) the pandemic lockdown periods in Greece. Distributions of descriptive characteristics were assessed, using χ^2 tests to estimate secular trends. **RESULTS** Of the 3,704 donors, 79% were males, and the mean age was 41.0 ± 10.8 years. Of the four months studied, the month with the lowest blood donation frequency was April 2019 and that with the highest was November of the same year. A decrease of -5.3% was observed between 2019 and 2020 ($p > 0.05$). The number of blood donors was higher in November 2019, April 2020 and November 2020 compared with April 2019, with the highest increase in November 2019 (+23.8%) and the lowest increase in November 2020 (+1.8%), during the second lockdown period. Across the four months, April 2019 to November 2020, a reduction in blood donation by males was observed (from 83.2% to 76.6%) and a corresponding increase by females (16.8% to 23.4%), and by those living in rural areas ($p < 0.05$). **CONCLUSIONS** The restrictions imposed due to fears of super transmission of the virus during the lockdown period did not appear to change volunteer blood donation, which remained at approximately the same levels as before the lockdown period.

Ancient Greek philosophers such as Plato, Timeus and Hippocrates referred extensively in their texts to the blood and its importance for the preservation of life.¹ Human donation is the only way to procure blood to cover emergency and regular needs. Maintaining an adequate, safe blood supply is one of the primary aims of blood centers and hospital blood donation services worldwide.² The blood supply chain is affected by a variety of factors that may operate independently, or may influence each other.

A recent factor with a possible impact on blood donation has been the outbreak of the SARS-CoV-2 coronavirus disease (COVID-19), which was identified in the city of Wuhan, China in 2019 and was declared a pandemic by the World Health Organisation (WHO) on 11 March 2020.

This caused major disruptions at all levels of health care and had a clearly negative effect on blood collection, given that SARS-CoV-2 is extremely contagious, forcing blood banks to adopt new measures to protect donors.³⁻⁵ The long incubation period of the disease, combined with its transmission by respiratory droplets and the lack of specific treatment, led the governments of many states, including Greece, to impose travel restrictions and lockdowns in cities to prevent its spread.

The novel coronavirus disease disrupted blood transfusion services worldwide, with many countries reporting a dangerous drop in blood reserves during to the pandemic.^{2,6,7} Despite the fact that blood transfusion services took precautionary measures to minimise the risks of COVID-19

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ΑΡΧΕΙΑ ΕΛΛΗΝΙΚΗΣ ΙΑΤΡΙΚΗΣ 2023, 40(3):317–323

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Η συχνότητα συμμετοχής σε ένα περιφερειακό κέντρο αιμοδοσίας της Κρήτης (Ελλάδα) κατά την περίοδο του αποκλεισμού της πανδημίας SARS-CoV-2

Abstract at the end of the article

Key words

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during blood donation procedures, donors became anxious about the risk of COVID-19 infection during the donation process, and blood transfusion services inevitably faced the hazard of blood shortage.⁸ Ensuring a regular supply of safe blood is the ultimate aim of blood donation. The justified fear of attending blood donation centers, particularly those in hospitals, and the implementation of measures to prevent the spread of the virus have affected donor attendance. The basic blood donation message was redefined in order to include measures to restore donor confidence, to encourage donors and to raise awareness of safe donation during the pandemic, while stressing the need for strict maintenance of social distancing.^{9–11} Similar activities were observed in Greece during the pandemic.¹²

The aim of this study was to investigate the frequency of participation of volunteer blood donors during the lockdown period of the SARS-CoV-2 pandemic.

MATERIAL AND METHOD

Study design, sample and participants

A retrospective-observational study was carried out in the spring of 2021 based on the archive of volunteer blood donors at the Blood Donation Center and the External Units of the “Venizelio-Panania” General Hospital of Heraklion, Crete, in Greece, which is the reference blood donation center for Crete. The study included archival data comparing time periods before and during pandemic lockdown. The sample selected for the study concerned four months, April and November 2019, and April and November 2020. The months in 2020 were during a lockdown period. The final sample consisted of 3,704 volunteer blood donors who attended the center and or the external units during the selected months.

Data collection

Donor data were collected via a digital search of the archive of the Blood Donation Center of the Heraklion General Hospital. The data retrieved included the basic demographic characteristics of the donors and certain clinical and epidemiological characteristics, such as their blood group and the Blood Donation Center or External Unit which they attended. The data were stored in a database under a code number, and, due to the nature of the study, it was impossible for any member of the research team to come into contact with individuals in the study sample.

Ethical considerations

Ethical approval was obtained from the Research and Bioethics Committee (IRB; Hellenic Mediterranean University, Crete 492/8.3.2021) and the “Venizelio-Panania” General Hospital of Heraklion, Crete (5/22.4.2021). Permission to use the hospital

facilities was obtained by the authors prior to data collection. All procedures performed in studies involving human participants were in accordance with 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Statistical analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS) software (IBM SPSS Statistics for Windows, IBM Corp, Armonk, NY), version 26.0. Frequency distributions of the descriptive characteristics of the donors were estimated, with the relevant 95% confidence interval (95% CI). For testing of parameter correlations, χ^2 testing was used, with emphasis on the linear change in secular trends between the four months of the study and between the two years. A critical value of 5.0% was considered statistically significant.

RESULTS

Of the total of 3,704 blood donors in the four months of April and November of 2019 and 2020, significantly more were males (79%; 95% CI: 77.7–80.6) versus 21% females. The mean age of the donors was 41 ± 10.8 years, with a range of 18–66 years, and most (33.6%) were aged 41–50 years (tab. 1). Significantly more than half (56.2%; 95% CI: 54.6–57.7) were from urban areas, reflecting the actual population distribution of the region.

Classification of the participants according to the eight blood groups (fig. 1) showed that significantly more were A+ (39.0%) and O+ (36.1%), compared with the other blood groups ($p < 0.05$), followed by B+ (10.8%) and lastly AB- with 0.3%.

The multiple reasons and ways by which the donors

Table 1. Basic characteristics of the 3,704 recorded blood donors in four months studied, April and November 2019 and April and November 2020.

		n	%	95% CI	
Gender	Males	2,927	79.0	77.7	80.3
	Females	777	21.0	19.7	22.3
Age (years)	Mean age \pm SD		41.0 \pm 10.8		
	18–30	732	19.8	18.4	21.1
	31–40	984	26.6	25.1	28.0
	41–50	1,244	33.6	32.2	35.1
	51–66	744	20.1	18.8	21.4
Area of residence	Urban	2,082	56.2	54.6	57.7
	Rural	1,622	43.8	42.3	45.4

CI: Confidence interval, SD: Standard deviation

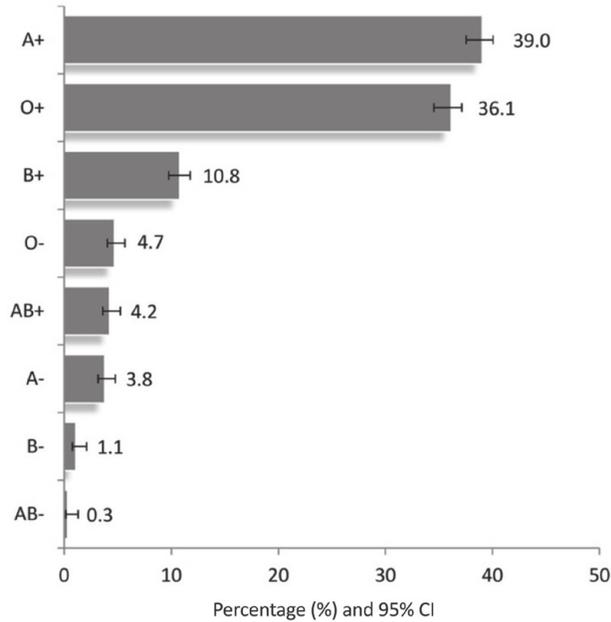


Figure 1. Blood group distribution of the recorded blood donors in the study (n=3,704). CI: Confidence interval.

Table 2. Reasons for blood donation of the donors in the study (n=3,704).

Reasons		n	%	95% CI	
As a volunteer	No	2,334	63.0	61.5	64.6
	Yes	1,370	37.0	35.4	38.5
For an association	No	2,343	63.3	61.7	64.9
	Yes	1,361	36.7	35.1	38.3
For a specific patient	No	2,733	73.8	72.4	75.2
	Yes	971	26.2	24.8	27.6
For blood donation	No	2,195	59.3	57.6	60.8
	Yes	1,509	40.7	39.2	42.4
At an external unit	No	1,529	41.3	39.8	42.9
	Yes	2,175	58.7	57.1	60.2

CI: Confidence interval

came to donate blood (tab. 2), included 37% volunteers, with a similar percentage, 36.7%, donating through an association and 26.2% for a specific patient; 40.7% came for blood donation and 58.7% donated at an external unit. A significantly lower proportion came to donate for a specific patient compared with the other categories ($p < 0.05$).

Table 3 presents the percentage distribution of the 3,704 recorded blood donors over the four selected months in 2019 and 2020, i.e., before and during the lockdown due to COVID-19. The lowest blood donor frequency, 22.9%,

Table 3. Percentage distribution of the recorded blood donors (n=3,704) between the four selected months of 2019 and 2020 (before and after the COVID-19 lockdown).

Month	2019			2020		
	n	%	95% CI	n	%	95% CI
April	850	22.9	21.7–24.3	937	25.3	24.0–26.8
November	1,052	28.4	26.9–29.9	865	23.4	21.9–24.7
Total	1,902	51.3	49.8–52.9	1,802	48.7	47.1–50.2

CI: Confidence interval

was recorded in April 2019, and the highest, 28.4%, in November of the same year, followed by 25.3% in April 2020 (during the first lockdown period), and 23.4% in November 2020 (during the second lockdown). Overall, the highest percentage in the four months was in November 2019 (28.4%, 95% CI: 26.9–29.9), while, comparing the total of the two months of each year, a non-significant decrease of -5.3% was observed between 2019 and 2020 (51.3% versus 48.7%, $p > 0.05$).

Figure 2 presents the absolute donation frequencies of the 3,704 recorded donors in the four selected months of 2019 and 2020, before and during the lockdown due to COVID-19, with their polynomial change. Matching the corresponding frequencies presented in table 3, November 2019 recorded the highest number of donors (n=1,052) and April 2019 the lowest (n=850); this was during a non-lockdown period, before the start of the pandemic. Comparing the recorded donors across the four selected months of 2019 and 2020, in November 2019 and April and November 2020 the number of blood donors increased compared with April 2019, with the highest increase of +23.8% found in November 2019, followed by +10.2% in

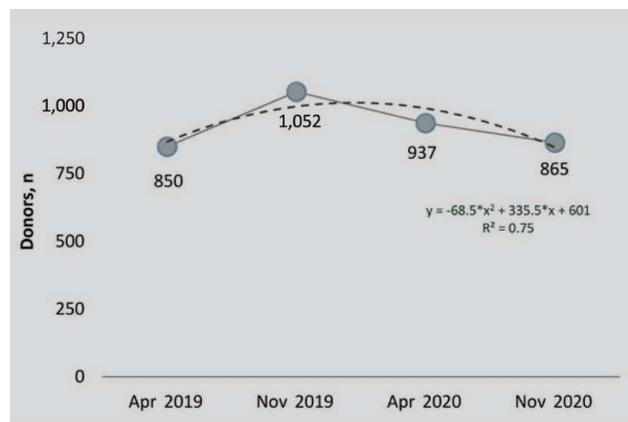


Figure 2. Temporal distribution of the recorded blood donors among the four selected months of 2019 and 2020 (before and after the COVID-19 lockdown) (n=3,704).

April 2020 and the lowest increase of +1.8% in November 2020 (results not shown in figure).

In the four months included in the study, between April 2019 and November 2020, there was a small significant reduction in blood donation by males from 83.2% (95% CI: 80.7–85.6) to 76.6% (95% CI: 73.6–79.4) (fig. 3). There was also a small significant increase in blood donation by females from 16.8% (95% CI: 14.4–19.3) to 23.4% (95% CI: 20.6–26.4). The percentage distribution of donors by age did not differ significantly between the four months of the study ($p>0.05$) (results not shown in figure).

Regarding their place of residence (tab. 4), the proportion of blood donors living in urban areas decreased significantly from 60.2% in April 2019 to 58.5% in November 2020 ($p<0.001$). The proportion of those living in rural areas increased accordingly from 39.8% to 41.5% ($p<0.001$). Over

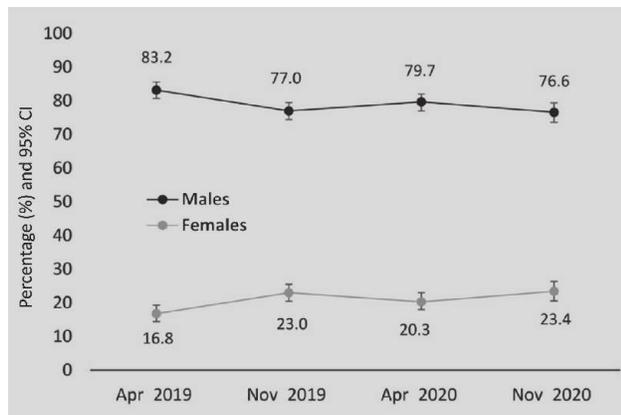


Figure 3. Temporal comparison of percentage distribution of total blood donors between the four selected months of 2019 and 2020 (before and after the COVID-19 lockdown) ($n=3,704$). CI: Confidence interval.

Table 4. Percentage distribution of recorded blood donors ($n=3,704$) between the four selected months of 2019 and 2020 (before and after the COVID-19 lockdown) according to area of residence.

	2019		2020		p-value
	April	Nov	April	Nov	
<i>Area of residence</i>					
Urban	60.2%	64.4%	41.3%	58.5%	<0.001
Rural	39.8%	35.6%	58.7%	41.5%	
<i>Area of residence</i>					
Urban	62.5%		49.6%		<0.001
Rural	37.5%		50.4%		

χ^2 test for linear trend

Nov: November

the two years of the study, the proportion of donors living in urban areas decreased significantly from 62.5% in 2019 to 49.6% in 2020, while that of donors living in rural areas increased significantly from 37.5% to 50.4% ($p<0.001$).

Significant differences were also found between the four months of the study in the reasons for, and ways by which the donors came to donate blood (tab. 5). The proportion of volunteers increased significantly from 34.1% in April 2019 to 46.6% of donors in November 2020 ($p<0.001$). The proportion of donors giving blood at external units also increased over the same period (from 51.4% to 59.7%, $p<0.001$). Conversely, there was a significant decrease in the proportion of donors donating through an association, from 33.9% in April 2019 to 23.5% in November 2020 ($p<0.001$), for a specific patient (from 32.2% to 30.2% over the same period, $p=0.024$) or for blood donation in general (from 48.2% to 40.1% over the same period, $p<0.001$).

DISCUSSION

The aim of this study was to investigate the frequency of participation of volunteer blood donors at a General Hospital in Crete, Greece during the lockdown period of

Table 5. Percentage distribution of recorded blood donors ($n=3,704$) among the four selected months of 2019 and 2020 (before and after the COVID-19 lockdown) according to reasons for donation.

Reasons	2019		2020		p-value
	Apr	Nov	Apr	Nov	
<i>As a volunteer</i>					
No	65.9%	76.4%	54.2%	53.2%	<0.001
Yes	34.1%	23.6	45.8	46.6%	
<i>For an association</i>					
No	66.1%	50.3%	63.0%	76.5%	<0.001
Yes	33.9%	49.7	37.0	23.5%	
<i>For a patient</i>					
No	67.8%	74.0%	82.6%	69.8%	0.024
Yes	32.2%	26.0%	17.4%	30.2%	
<i>For blood donation</i>					
No	51.8%	60.8%	63.7%	59.9%	<0.001
Yes	48.2%	39.2%	36.3%	40.1%	
<i>At an external unit</i>					
No	48.6%	39.8%	37.1%	40.3%	<0.001
Yes	51.4%	60.2%	62.9%	59.7%	

χ^2 test for linear trend

Apr: April, Nov: November

the SARS-CoV-2 pandemic. In brief, the study of 3,704 recorded blood donors in the four selected months in 2019 and 2020 showed that the restriction of movement and social distancing measures imposed due to fears of super transmission of the virus during the lockdown period did not change volunteer blood donation, as it remained at approximately the same levels as before the lockdown period. There was a significant increase in female volunteers and increased participation by donors from rural areas during the lockdown months.

In the international bibliography, a different approach to investigating the impact of the pandemic is observed in numerous studies. It is becoming evident that there has been a general decrease in volunteer blood donation during the pandemic, which may be due to reduced needs or demands, as described in a study in Nigeria.¹³ Although they found a decrease of 26.1% in 1,638 donors, the researchers argued that this drop was not a direct consequence of the pandemic, as there is a concomitant decrease of 18.9% in demand for blood. In their discussion, however, they observed that the fall in blood donation is partly due to stress of potential donors about the pandemic, and their fear of exposure to the virus, an element also noted by other researchers.^{9–11} Similar studies have shown relative decrease of 39.5%¹⁴ and 34.7%,¹⁵ or fluctuations.^{16,17} A study of 1,205 blood donors in seven European countries found that just 33.8% donated during the first 4–5 months of the COVID-19 period, reducing their donation frequency, while they estimated that respondents who faithfully adhered to COVID guidelines and restriction measures had lower odds of donating (odds ratio [OR]=0.58; $p < 0.001$).¹⁸

Taking the above reports into account, we need to evaluate how the Cretan Blood Donation Center in the present study managed to record only a small decrease between the non-pandemic and pandemic years, and even a temporary increase in specific months of 2020 compared with April 2019. The basic actions undertaken by the Blood Donation Center involved organisation of external donations, using the mobile unit, mainly in areas distant from the urban center, combined with basic primary healthcare facilities, such as the rural health centers. Such efforts were already underway, but they became more intensive during the pandemic, and therefore more effective, although their qualitative evaluation is outside the scope of the present study. The external donations were set up via written notification and included measures such as a set number of donors (45–50 people), a set service flow, provision of specific appointments with 2–3 people every 15 minutes, and the use of protective equipment (masks, etc.).

Mention of blood donation measures and organisation in the international bibliography is limited, but not negligible. One study in Campinas Brazil, reported that the Hemocentro UNICAMP collects approximately 6,000 units of blood per month, with one-third being collected by mobile units. Faced with the pandemic, and given that Brazil had the second highest death toll in the world up to the spring of 2021 (<https://www.worldometers.info/coronavirus/>), following national recommendations the Hemocentro UNICAMP adopted specific measures to prevent transmission of the virus and to meet blood needs during the period 3 March to 12 April 2020. The measures included introduction of appointments, reorganisation of waiting areas with 1.5 m between chairs, and the installation of 70% alcohol gel dispensers at each step of the process. As a result of these actions, a 14.5% increase was reported in the median number of weekly donations. They also showed that these appointments accounted for 42.2% of all donations made during that period. They therefore concluded that the approach was a success and they recommend that other Blood Centers design similar strategies under pandemic conditions, for collecting blood and maintaining blood reserves to cover needs.¹⁹

Another key point that emerged from the present study concerned donor gender differences, with a significant increase in women donors from April 2019 to November 2020. A similarly designed study was carried out in Iran, collecting data on donors in specific months from a database, in order to make a direct comparison regarding the effect of the pandemic.¹⁷ They collected data on all donors in two consecutive months in the two years, February and April 2019 ($n=409,231$) and February and April 2020 ($n=312,056$). Apart from a decrease in total donors from 2019 to 2020, they also observed a significant increase in the proportion of female donors from 3.95% to 5.31% ($p < 0.001$). Although this differentiation could be expected, due to the large number of selected donors, the participation of women appeared to increase, but remains low. As the authors note, the most likely explanation is that a similar increase in female participation has been observed in other global crises or disasters (e.g., earthquakes, September 11, natural disasters), perhaps due to the greater impact on women's emotions, leading them to give blood, especially in response to donor appeals by the relevant services.¹⁷

Apart from highlighting the gender differences, the present study showed increased participation of donors in rural areas. This development apparently corresponds to the increase in donation frequency by volunteers and by people donating at external units. As part of its aware-

ness campaign, the Center mobilised its staff, organising, as mentioned above, external donations in areas distant from the urban center. This practice can be continued, with the appropriate backup and support, over longer periods, independent of the pandemic or other crises. As reported in the Brazilian study, it is important to note that the use of external units and the arrangement of appointments and minor interventions ensure donor safety and can contribute effectively to the promotion of blood collection.¹⁹

Limitations of the study

An effort was made to design the present study in the best possible way to provide strong data on secular trends in donor distribution during the pandemic lockdown period. Selecting more months would obviously have provided more reliable and valid secular trends, while selecting a greater number of consecutive months would have provided the opportunity to evaluate seasonal fluctuations, while also reflecting the specific lockdown measures. These

data clearly require a more comprehensive sampling survey, using a questionnaire to evaluate the intentions, attitudes and perceptions of donors regarding their blood donation.²⁰

In conclusion, this evaluation of frequency of volunteer donor participation during lockdown compared to the previous year showed that, in spite of the restriction of movement and social distancing measures and fears of super transmission of the virus, volunteer blood donation in Crete remained at approximately the same levels. Specifically, there was a small decrease between 2019 and 2020, but based on the four specific months selected for study, there was also a temporary increase in November 2019 and April and November 2020 compared with April 2019. A significant increase was also observed in women donors, donors in rural areas, volunteer donors and donations at external units. All these factors should be taken into account in strategic planning, with the constant mobilization of all participants, to ensure that blood collection and reserves meet the needs of the healthcare facilities.

ΠΕΡΙΛΗΨΗ

Η συχνότητα συμμετοχής σε ένα περιφερειακό κέντρο αιμοδοσίας της Κρήτης (Ελλάδα) κατά την περίοδο του αποκλεισμού της πανδημίας SARS-CoV-2

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ΣΚΟΠΟΣ Η διερεύνηση της συχνότητας της εθελοντικής αιμοδοσίας κατά την περίοδο του αποκλεισμού. **ΥΛΙΚΟ-ΜΕΘΟΔΟΣ** Μια αναδρομική μελέτη παρατήρησης έλαβε χώρα την άνοιξη του 2021 στο Τμήμα Αιμοδοσίας του Γενικού Νοσοκομείου Κρήτης, Ελλάδα. Περιλάμβανε δεδομένα αρχείου 3.704 αιμοδοτών συγκρίνοντας χρονικά μεσοδιαστήματα 4 μηνών, πριν (Απρίλιος/Νοέμβριος 2019) και κατά τη διάρκεια (Απρίλιος/Νοέμβριος 2020) των περιόδων καραντίνας για την πανδημία στην Ελλάδα. Εκτιμήθηκαν οι κατανομές των περιγραφικών χαρακτηριστικών, και στις συσχετίσεις κατηγορικών παραμέτρων χρησιμοποιήθηκε και ο έλεγχος χ^2 . **ΑΠΟΤΕΛΕΣΜΑΤΑ** Το 79,0% ήταν άνδρες και η μέση ηλικία όλων ήταν τα 41 έτη ($\pm 10,8$). Στους 4 μήνες, η χαμηλότερη συχνότητα αιμοδοσίας βρέθηκε τον Απρίλιο του 2019 και η υψηλότερη τον Νοέμβριο του ίδιου έτους καθώς παρατηρήθηκε μείωση -5,3% μεταξύ 2019 και 2020 ($p > 0,05$). Ο αριθμός των αιμοδοτών αυξήθηκε τον Νοέμβριο του 2019, τον Απρίλιο του 2020 και τον Νοέμβριο του 2020 σε σύγκριση με τον Απρίλιο του 2019, με τη μεγαλύτερη αύξηση τον Νοέμβριο του 2019 (+23,8%) και τη χαμηλότερη τον Νοέμβριο του 2020 (+1,8%), κατά τη δεύτερη περίοδο αποκλεισμού. Το τετράμηνο (Απρίλιος 2019 έως Νοέμβριος 2020) παρατηρήθηκε μείωση της αιμοδοσίας στους άνδρες (83,2% σε 76,6%) και αύξηση στις γυναίκες (16,8% έως 23,4%) καθώς και στις αγροτικές περιοχές ($p < 0,05$). **ΣΥΜΠΕΡΑΣΜΑΤΑ** Οι περιορισμοί που επιβλήθηκαν λόγω φόβων υπερμετάδοσης του ιού κατά την περίοδο του αποκλεισμού δεν άλλαξαν την αιμοδοσία μέσω του εθελοντισμού, καθώς παρέμεινε στα ίδια περίπου επίπεδα με την πριν από την περίοδο του αποκλεισμού.

Λέξεις ευρητηρίου: Αιμοδοσία, Αποκλεισμός, Εθελοντισμός, COVID-19, Πανδημία

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